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Attorney Docket No. 57002

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent No. 7,310,306

Confirmation No. 5517

Issued: Dec. 18, 2007

Name of Patentee: Cheriton

Patent Title: METHOD AND APPARATUS FOR INGRESS PORT FILTERING FOR PACKET SWITCHING SYSTEMS

REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT FOR PATENT OFFICE MISTAKE (37 C.F.R. § 1.322)

Attn: Certificate of Correction Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

It is requested that a Certificate of Correction be issued to correct Office mistakes found the above-identified patent. Attached hereto is a Certificate of Correction which indicates the requested correction. For your convenience, also attached are copies of selected pages (a) from the issued patent with errors highlighted, and (b) from the original application as filed October 16, 2001 and (c) Examiner's Amendment in Notice of Allowance mailed September 5, 2007 and (d) Amendment D filed June 22, 2002, with the correct text/instructions.

It is believed that there is no charge for this request because applicant or applicants were not responsible for such error, as will be apparent upon a comparison of the issued patent with

the application as filed or amended. However, the Assistant Commissioner is hereby authorized to charge any fee that may be required to Deposit Account No. 501430.

Respectfully submitted,
The Law Office of Kirk D. Williams

Date: 11-25-2009 By _____

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 7,310,306
APPLICATION NO. : 09/981,125
DATED : Dec. 18, 2007
INVENTOR(S) : Cheriton

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Col. 8, line 20, replace "devices: rather" with – devices; rather –

Col. 10, line 24, replace "stream" with – stream; --

Col. 11, line 34, replace "Rackets" with – packets –

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FIG. 1A illustrates one embodiment of a packet switching system. Although only one input interface **110**, two filters **114** and **115**, two packet switches or components **121-129**, and one packer merger or switch **130** are illustrated in FIG. 1A for ease of reader understanding, it is to be understood that a packet switching system may, and typically does, contain more of these components than actually shown.

Packets **101** are received by an input interface **110** of the packet switching system. Configurable splitter **112** provides a copy of the received packet stream **101** to all filters **114-115**. Splitter **112** may be an electrical connection, electrical device, an optical device, or any other signal splitting and/or replication device or technology. Filters **114-115** are programmed over control signals **113** and **116** as to which packets to forward and which packets to drop. One embodiment uses a set of rules which match values contained in a packet, which may include, but are not limited to source address, destination address, packet type, and quality of service values. In one embodiment, filters **114-115** are programmed such that during a normal operating state, on average, they forward approximately a same level of packet traffic or same number of packets.

Filters **114-115** are responsive to control signals **113** and **116** to switch from a normal operating state to a state of forwarding all packets or forwarding no packets. Using these three states, the load generated by a single packet stream can be distributed across multiple inputs, and in case of failure effecting packet traffic forwarded by less than all of filters **114-115**, filters **114-115** can be modified to overcome the failure.

Packets forwarded by filters **114-115** are received by packet switches or components **121-129**, which may be packet switch interfaces or actual packet switches themselves. These received packets are then routed as normal. In one embodiment, redundant and duplicate packet switches **121-129** are used for fault tolerant reasons, and packet merger or switch **130** merges, as required, output streams for the same destination generated by packet switches **121-129** into a single packet stream as indicated by packets **131**.

FIG. 1B illustrates another exemplary embodiment of a packet switching system according to the invention. A packet steam **151** is received by configurable splitter **152**, which provides the packet stream to packet switch interfaces with filters **161-169**, which perform the filtering as described herein, and provide the distribute and filtered streams to packet switch **170**.

FIG. **2** illustrates an exemplary embodiment of a configurable filtering system **200**. Configurable filtering system **200** is programmed over control signal **205** as to which packets are to be forwarded and which packets are to be dropped. Typically, this programming comprises a set of rules which operate on values contained within a packet. Additionally, control logic **201**, in response to control signal **205**, dynamically can change its filtering policies.

In one embodiment as part of a fail-over or redundant system, configurable filtering system **200** includes at least three filtering states: normal operating mode, all packet forwarding, and all packet blocking. In the normal operating state, configurable filtering system **200** can be one of multiple filters which are used to load balance a stream of packets across redundant systems. Upon detection of a failure or in response to a manual request (such as when the system is undergoing selective maintenance), the packets dropped and forward by these filters can be readily and quickly be modified such that the received packet traffic is routed to avoid one or more of the redundant systems (or other downstream components or routes) which is experiencing trouble or for maintenance, etc.

In one embodiment, control logic **201** includes specialized hardware (e.g., CAMs), which are programmed with the filtering instructions. In one embodiment, control logic **201** includes a processor which uses memory and storage devices **202** to perform one or more tasks or processes. Memory and storage devices **202** is or more one types of computer-readable medium, and typically comprises random access memory (RAM), read only memory (ROM), flash memory, solid state circuits, integrated circuits, and/or other memory components, and may also comprise disk drives, diskettes, networked services, tape drives, and other storage devices. Memory and storage devices **202** typically store computer-executable instructions to be executed and/or data which is manipulated for implementing functionality in accordance with the invention.

As used herein and contemplated by the invention, computer-readable medium is not limited to memory and storage devices: rather computer-readable medium is an extensible term describing memory, storage device, and/or other storage mechanism that can be used to tangibly embody computer-executable instructions or data.

A packet stream **206** is received into packet buffer **207**, and based on a forwarding decision performed by control logic **201**, particular packets of packet stream **206** are either dropped or forwarded as indicated by egress packet stream **208**.

FIG. **3A** illustrates one process of one embodiment for programming and modifying the forwarding state of a configurable filter. Processing begins at process block **300**, and proceeds to process block **302**, wherein a control signal is received. As determined in process block **304**, if the received signal indicates to forward all packets (e.g., in response to a detected error or fault condition or operator command), then the filtering scheme is modified in process block **306** to forward all packets. Otherwise, as determined in process block **308**, if the received signal indicates to drop all packets (e.g., in response to a detected error or fault condition or operator command), then the filtering scheme is modified in process block **310** to drop all packets. Otherwise, as determined in process block **312**, if the received signal is a set of programming commands, then the filtering scheme is updated in process block **314**. Processing returns to process block **302** to receive and process more command signals.

FIG. **3B** illustrates one process used by one embodiment to determine whether or not to forward a particular packet. Processing begins at process block **320**, and proceeds to process block **322** wherein a packet is received, typically into a packet buffer. Next, as determined in process block **324**, if the filter scheme matches that the packet should be discarded (typically by applying a set of rules to values contained within the packet itself), then the packet is dropped in process block **328**. Otherwise, the packet is forwarded in process block **326**. Processing returns to process block **322** to receive and apply filtering policies to additional packets.

In view of the many possible embodiments to which the principles of our invention may be applied, it will be appreciated that the embodiments and aspects thereof described herein with respect to the drawings/figures are only illustrative and should not be taken as limiting the scope of the invention. For example and as would be apparent to one skilled in the art, many of the process block operations can be re-ordered to be performed before, after, or substantially concurrent with other operations. Also,

many different forms of data structures could be used in various embodiments. The invention as described herein contemplates all such embodiments as may come within the scope of the following claims and equivalents thereof.

What is claimed is:

1. A packet switching system comprising:
a packet stream splitter;
an input interface of the packet switching system, and
a plurality of packet switches;
wherein the input interface includes a plurality of configurable filters coupled to the packet stream splitter and each of said configurable filters is communicatively coupled to a different single one of said packet switches;
wherein the packet stream splitter is configured to receive a packet stream and to provide a copy of said received packet stream to each of said configurable filters; and
wherein each of said configurable filters is configured to forward an identifiable set of packets of said received packet stream such that each packet of said received packet stream is forwarded by a single one of said configurable filters regardless of the packet switching system being in a normal operating mode or a second operating mode; and wherein all packets forwarded by a configurable filter are forwarded to its corresponding said different single one of said packet switches; and
wherein in a normal operating mode, each of said configurable filters is configured such that there is at least one packet in its said identifiable set of packets; and wherein in a second operating mode, a particular configurable filter of said configurable filters is configured to forward no packets, and said identifiable set of packets of at least one said configurable filters other than the particular configurable filter is different than when in the normal operating mode in order for all packets of said received stream of packets to be forwarded by a single one of said configurable filters.

2. The packet switching system of claim 1, wherein said configurable filters include exactly two configurable filters including the particular configurable filter and a second configurable filter, and in the second operating mode, the second configurable filter is configured to forward all packets of said received packet stream.

3. The packet switching system of claim 1, wherein each of said configurable filters determines whether to drop or forward a particular packet of said received packet stream based on at least one value contained within the particular packet.

4. The packet switching system of claim 1, wherein each of said configurable filters determines whether to drop or forward a particular packet based on a value of a source address, a destination address, a packet type, or a quality of service of the particular packet.

5. The packet switching system of claim 1, wherein said received packet steam is received in an optical signal by the packet stream splitter and the packet stream splitter includes an optical splitter such that each of said configurable filters receives said optical signal.

6. The packet switching system of claim 1, wherein the packet stream splitter includes an electrical splitter.

7. The packet switching system of claim 1, comprising a packet stream merger coupled to the each of said packet switches configured to merge packets received from said configurable filters.

8. The packet switching system of claim 1, wherein the input interface includes the packet stream splitter.

9. The packet switching system of claim 1, wherein said configurable filters include more than two configurable filters including the particular configurable filter and a plurality of other configurable filters, and in the second operating mode, the packets in said identifiable set of packets corresponding to the particular configurable filter in the normal operating mode are redistributed among said identifiable set of packets of at least two of said other configurable filters.

10. A packet switching system comprising:
a packet stream splitter; and
a first and a second configurable filters coupled to the packet stream splitter, the first and the second configurable filters each including a normal operating state;
wherein the packet stream splitter is configured to provide a received packet stream to each of the first and the second configurable filters; and
wherein when the first and the second configurable filters are simultaneously in their respective normal operating states: each particular packet of the received packet stream is forwarded only by one of the first and the second configurable filters and both the first and second configurable filters are configured to forward at least one packet of the received packet stream
wherein the first and the second configurable filters determine whether to drop or forward a particular packet based on at least one value contained within the particular packet.

(2) should be "stream;"

11. The packet switching system of claim 10, wherein the first configurable filter further includes an all packet forwarding state, wherein the first configurable filter is configured to switch between the normal operating state and the all packet forwarding state in response to a signal.

12. The packet switching system of claim 11, wherein the signal is generated in response to detection of an error condition affecting a set of packets forwarded by the second configurable filter.

13. The packet switching system of claim 12, wherein the second configurable filter further includes an all packet blocking state, wherein the second configurable filter is configured to switch between the normal operating state and the all packet blocking state in response to the signal.

14. The packet switching system of claim 10, wherein the first and the second configurable filters determine whether to drop or forward a particular packet based on a value of a source address, a destination address, a packet type, or a quality of service of the particular packet.

15. The packet switching system of claim 10, wherein the first and the second configurable filters are each configured to forward approximately one-half of the packets received by the respective first or second configurable filter.

16. A packet switching system comprising:
a first means for filtering and forwarding;
a second means for filtering and forwarding; and
means for providing a received packet stream to each of the first means for filtering and forwarding and the second means for filtering and forwarding
wherein the first means for filtering and forwarding is configured to forward a first identifiable set of packets of said received packet stream, and the second means for filtering and forwarding is configured to forward a second identifiable set of packets of said received packet steam;
wherein when said first and second means for filtering and forwarding are in their respective normal operating states: a particular packet of the single received packet stream is forwarded only by one of said first and second

means for filtering and forwarding and both said first and second means for filtering and forwarding are configured to forward at least one packet.

17. The packet switching system of claim 16, wherein said first means for filtering and forwarding includes an all packet forwarding state, wherein the first configurable filter is configured to switch between the normal operating state and the all packet forwarding state in response to a signal.

18. The packet switching system of claim 17, wherein the signal is generated in response to detection of an error condition affecting a set of packets forwarded by said second means for filtering and forwarding.

19. The packet switching system of claim 18, wherein said second means for filtering and forwarding includes an all packet blocking state, wherein said second first means for filtering and forwarding is configured to switch between the normal operating state and the all packet blocking state in response to the signal.

20. A method comprising:

receiving a stream of packets;

providing the stream of packets to both a first and a second configurable filters;

the first configurable filter determining whether or not to forward a particular packet from the stream of packets based on a first programmable filtering scheme;

the second configurable filter determining whether or not to forward a particular packet from the stream of packets based on a second programmable filtering scheme;

wherein each particular packet of said received stream of packets is forwarded only by one of the first and the second configurable filters and both the first and second configurable filters are configured to forward at least one packet of said received stream of Rackets when simultaneously the first configurable filter is responsive to the first programming scheme and the second configurable filter is responsive to the second programmable filtering scheme.

(3) should be "packets"

21. The method of claim 20, further comprising:

the first configurable filter receiving a first signal;

the first configurable filter, in response to receiving the first signal, modifying its filtering scheme to forward all packets or to drop no packets;

the second configurable filter receiving a second signal; and

the second configurable filter, in response to receiving the second signal, modifying its filtering scheme to forward no packets or to drop all packets.

22. The method of claim 20, wherein the first and the second configurable filters determine whether to drop or forward a particular packet based on at least one value contained within the particular packet.

23. The method of claim 20, wherein the first and the second configurable filters determine whether to drop or forward a particular packet based on a value of a source address, a destination address, a packet type, or a quality of service of the particular packet.

24. The method of claim 20, wherein the first and the second configurable filters are each configured to forward approximately one-half of the packets received by the respective first or second configurable filter.

25. A packet switching system comprising:

a packet stream splitter; and

a first and a second configurable filters coupled to the packet stream splitter, the first and the second configurable filters each including a normal operating state;

wherein the packet stream splitter is configured to provide a received packet stream to each of the first and the second configurable filters;

wherein when the first and the second configurable filters are in their respective normal operating states: a particular packet is forwarded only by one of the first and the second configurable filters and both the first and second configurable filters are configured to forward at least one packet; and

wherein the first and the second configurable filters determine whether to drop or forward a particular packet based on at least one value contained within the particular packet.

26. A method comprising:

receiving a stream of packets;

providing the stream of packets to a first and a second configurable filters;

the first configurable filter determining whether or not to forward a particular packet from the stream of packets based on a first programmable filtering scheme; and

the second configurable filter determining whether or not to forward a particular packet from the stream of packets based on a second programmable filtering scheme;

wherein a particular packet is forwarded only by one of the first and the second configurable filters and both the first and second configurable filters are configured to forward at least one packet; and

wherein the first and the second configurable filters determine whether to drop or forward a particular packet based on a value of a source address, a destination address, a packet type, or a quality of service of the particular packet.

* * * * *

From Patent Application filed 10-16-2001

FIG. 2 illustrates an exemplary embodiment of a configurable filtering system 200. Configurable filtering system 200 is programmed over control signal 205 as to which packets are to be forwarded and which packets are to be dropped. Typically, this programming comprises a set of rules which operate on values contained within a packet. Additionally, control logic 201, in response to control signal 205, dynamically can change its filtering policies.

In one embodiment as part of a fail-over or redundant system, configurable filtering system 200 includes at least three filtering states: normal operating mode, all packet forwarding, and all packet blocking. In the normal operating state, configurable filtering system 200 can be one of multiple filters which are used to load balance a stream of packets across redundant systems. Upon detection of a failure or in response to a manual request (such as when the system is undergoing selective maintenance), the packets dropped and forward by these filters can be readily and quickly be modified such that the received packet traffic is routed to avoid one or more of the redundant systems (or other downstream components or routes) which is experiencing trouble or for maintenance, etc.

In one embodiment, control logic 201 includes specialized hardware (e.g., CAMs), which are programmed with the filtering instructions. In one embodiment, control logic 201 includes a processor which uses memory and storage devices 202 to perform one or more tasks or processes. Memory and storage devices 202 is or more one types of computer-readable medium, and typically comprises random access memory (RAM), read only memory (ROM), flash memory, solid state circuits, integrated circuits, and/or other memory components, and may also comprise disk drives, diskettes, networked services, tape drives, and other storage devices. Memory and storage devices 202 typically store computer-executable instructions to be executed and/or data which is manipulated for implementing functionality in accordance with the invention.

(1)

As used herein and contemplated by the invention, computer-readable medium is not limited to memory and storage devices; rather computer-readable medium is an

→ See Col. 8, line 20

From Examiner's Amendment in Notice of Allowance mailed 09-05-07

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Kirk Williams on 08/22/2007.

The claims filed on 06/22/2007 has been amended as follows:

- Claim 19 has been cancelled.
- In claim 15, line 11, "wherein the first and the second configurable filters determine whether to drop or forward a particular packet based on at least one value contained within the particular packet" have been added after "stream".

(2) adding this clause - previous clause must have punctuation (semicolon)

CONCLUSION

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jung Park whose telephone number is 571-272-8565. The examiner can normally be reached on Mon-Fri during 6:15-3:45.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chau Nguyen can be reached on 571-272-3126. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published

From Amendment D filed 06-22-2007

Claim 23 (currently amended): A method comprising:

receiving a stream of packets;

providing the stream of packets to both a first and a second configurable filters;

the first configurable filter determining whether or not to forward a particular packet from the stream of packets based on a first programmable filtering scheme;

the second configurable filter determining whether or not to forward a particular packet from the stream of packets based on a second programmable filtering scheme;

(3) See Col. 11 line 34

wherein a each particular packet of said received stream of packets is forwarded only by one of the first and the second configurable filters and both the first and second configurable filters are configured to forward at least one packet of said received stream of packets when simultaneously the first configurable filter is responsive to the first programming scheme and the second configurable filter is responsive to the second programmable filtering scheme.

Claim 24 (original): The method of claim 23, further comprising:

the first configurable filter receiving a first signal;

the first configurable filter, in response to receiving the first signal, modifying its filtering scheme to forward all packets or to drop no packets;

the second configurable filter receiving a second signal; and

the second configurable filter, in response to receiving the second signal, modifying its filtering scheme to forward no packets or to drop all packets.

Claim 25 (original): The method of claim 23, wherein the first and the second configurable filters determine whether to drop or forward a particular packet based on at least one value contained within the particular packet.